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An

Inaugural Dissertation

on the

Mechanism & Physiology

of the

Human Head

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Submitted to the

Medical Faculty

for the

Degree of Doctor of Medicine

by

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of

Virginia

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Felix qui potuit rerum cognoscere causas. Virg:

Introduction

The attention which has been bestowed upon the human head by anatomists and physiologists of every age – the precision with which the various peculiarities of its structure have been examined and described, afford, it is conceived, sufficient evidence of its impor=
=tance; and even if this were absent, a short reflection upon the nature of its connections with the system at large, and the part which it acts in the general econo=
=my, would amply suffice to supply its place. Assigned as the seat of the most important of those faculties, by which Man sustains his relation with surrounding objects, and, it may be added, his supremacy over all other terrestrial beings; it presents to the eye of the physical enquirer, some of the most interesting and skilful arrangements, to be met with, perhaps, in any part of the human system. To elucidate these is the design of the present essay. The author regrets that he brings to the undertaking, so inadequate a share of

ability and observation; but, he is not without a hope, that the errors, which inevitably attend the paths of inexperience, even in the simplest pursuits, will re=
=ceive from those, to whom he has the honour to sub=
=mit the result of his enquiries, a kind and liberal in=
=dulgence.

I. 1. The first circumstance, connected with the human head, which seems entitled to attention, is its elevated position. This is the peculiar characteristic of the dignity of Man, and of his superior rank in the scale of creation. In the beautiful language of the Poet,

Deus

Os homini sublime dedit: coelumque tueri;
Jussit et erectos, ad sidera, tollere vultus.

It would seem, indeed, on a casual observation, as if the remainder of the frame were only designed to afford to this particular part of it, a firm support and to maintain it secure in its commanding pre-eminence.

Nature, though simple in her operations, is ever pro=
=found; and one of her chief merits consists in deriving,
from single causes, a variety of useful & interesting effects.
Of the truth of this remark, this apparently trivial cir=
=cumstance of the head, furnishes a sufficient illustra
=tion. While by this means, Man impresses upon other
animals, a sense of his superiority; his intellect is
enlarged, by a wider scope of observation, and his
senses removed beyond the influence of those gross,
corporeal objects, to which the latter, by the very cir=
=cumstance of a peculiar form, seem naturally
allied;

Quæ natura prona atque ventri obedientia
finxit. Sall:

He looks abroad; he contemplates the extended beau
ty of the earth and skies; and selects objects wor thy
of peculiar admiration, by the opportunity of com
=parison, which an enlarged vision affords. That the
elevation of the head is the peculiar attribute of a su

=perior and intellectual being, is indicated by the fact, that it is not the congenital attribute even of the hu=
=man race, but the acquirement of age. At an early period of life, when his wants are the only stimulus to exertion — when a feeble cry or an imperfect strug=
=gle is the only means, by which they are commu=
=nicated to others — when instinct has not yet yield=
=ed to the voice of reason; like the inferior animals, the child crawls upon the earth, consumes the greater portion of his time in sleep and inactivity, and pre=
=sents, in almost every respect, the peculiarities of the quadruped. But existence advances. The dawn of intel=
=lect accompanies an inclination to stand erect; by degrees surrounding objects attract his attention; the soporose tendency declines; instinct resigns her arbi=
=trary controul, and intellect becomes gradually de=
=veloped, by an attachment to particular pursuits, and a general and lively curiosity. The figure soon becomes steady & upright; the head is elevated; and the senses

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thus receive the most suitable position, for the fulfil=
=ment of their peculiar duties. By some naturalists, the
opinion has been advanced, that man is by nature, a
quadruped; and the upright position, by which he is
distinguished in a civilized state, the result only of
habit & imitation. But, independently of many other con
siderations to the same effect, there are various circumstan
ces connected with the shape and position of the head, wh.
conclusively establish the entire fallacy of the hypoth
=esis. In contemplating the head of the quadruped,
there are two circumstances particularly remarkable;
first, the elongated form; & secondly, the relative sit
=uation of the encephalic cavity. With respect to the
former, this is obviously favourable to their inclined
attitude, the part in advance of the spine being much
greater, than that behind it; while in the latter, it is
evident, that nature has provided against the incon=
venience which would constantly exist, by giving to
the brain a more advanced situation. In the human

species, directly the reverse takes place, in both cases. The spine occupies nearly the central part of the head, while the greater portion of the brain is situated in the front. If it be true, then, that Man is originally a quadruped, Nature has committed, in this arrange=ment, a great mistake; the position of the head must be invariably inconvenient, and its movements constant=ly obstructed by the weight which has been placed in its anterior part. I will here take occasion to introduce, from Doctor Horner's treatise on Anatomy, the follow=ing considerations to the same purport. "1st: The liga mentum nuchæ weak in man, is strong in quadrupeds. 2nd: The curvatures of the spine are so varied, as to di=minish the tendency to fall forwards, when we stand erect. 3rd: The direction of the orbits of the eyes, which looking forwards, when we stand, and enabling the eye to apply itself to a vast circumference, would, in the quadruped position, be directed towards the ground & thereby leave the sphere of observation reduced to a few yards

4th: The opening of the nostrils, when we stand, permits odours to ascend easily into the nose; in the other attitude, this opening would be directed backwards. Such are the circumstances in connection with the head only which indicate the necessity of the biped position for the full enjoyment of the functions which the Creator has given to us".

1.2. Daily observation indicates the existence of a very close connection, between the position of the head and the state of the mind and feelings. When this latter is a=greeable, the fact is indicated by a peculiar lightness and ease in the aspect and movements of the head; while, on the other hand, in those who have become the hapless victims of sorrow and misfortune, it yields to the in=fluence of gravity and sinks, an inert and oppressive burthen on the chest. In the season of youth, when ev=ery object seems to be fraught with interest, when the spirits are buoyant, and the mind is filled with viv=id pictures of future joy; the elevated head indicates the hap=

=piness of its possessor; while, in the calm twilight of declining age, when reflection delights to dwell on the vanity of all terrestrial enjoyments, it is inclined involuntarily to the earth, as if Nature intimated to man the path in which he must soon travel - the lowly couch on which he is shortly to repose forever. The position of the head may also be regarded, as affording a toler=able diagnostic between the two general classes of the mental diseases; namely, those of a sad and melancholy character, and those of a violent and furious nature. A case detailed by Dr. Rush in his interesting work on the diseases of the mind, indicates, I think with much clearness, the conection subsisting between the integrity of the mental faculties, and the erect attitude; & which even seems to prove, that the entire loss of the former is inconsistent with the maintainance of the latter. The disease was Manalgia, and commenced with a depression of the head, a general listlessness & languor, together with a manifest obliquity of mind: As it con

=tinued, the mind became still more affected, and the patient himself could move contentedly only on his hands and feet. At length, the intellectual faculties appeared to have receded altogether; the patient lost =entirely the power of locomotion; lay prostrate on the ground, like a mass of inanimate matter; and accord=ing to the history of the case, would roll from the top to the bottom of a flight of stairs, without an effort to save himself. Perhaps this would be the case, in all the diseases of the mind were they all, as in the in stance just stated, attended with a complete sus=pension of the mental faculties; but such does not appear to be the fact; in the furious forms of insanity, the latter are not lost, but deranged; their just & heal=thy balance is destroyed; the impulses of thought are rapid and irregular, and the motions of the head, in like manner, sudden and impetuous. In these cases, consequently, the head is always thrown erect. "It is well known", says Thomas, "that patients of this description

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have their symptoms aggravated by being placed in a recumbent attitude. They seem, of themselves, to avoid the horizontal posture, as much as possible, when they are in a raving state; and, when so confined, that they cannot be erect, will support themselves on the breech" Some, indeed, have gone so far, as even to assign to particular positions of the head, particular feelings and passions. "The whole head," says Goldsmith, "as well as the features of the face, take peculiar attitudes from the passions; it bends forward to express humility, shame & sorrow; it is turned to one side, in languor or in pity; it is thrown, with the chin forward, in arrogance and pride; erect in self conceit and obstinacy; it is thrown backwards in astonishment, and combines its motions, to the one side and the other, to express contempt, ridicule anger and resentment." These circumstances have not escaped the attention of Statuaries and painters.

I.3. The position of the head is one the chief means of its

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protection from external injury; a design which is still farther promoted, by the relative situation of those vigilant outposts of the system, the external organs of the senses. Excepting one, that of touch, they are all confined to it; and, only a short consideration will suffice, to establish the propriety of this exception, and even to indicate its entire necessity. It has not resulted from a deficiency of room; for the superior frontal, occipital and parietal regions of the cranium, are unoccupied; and the wisdom which nature universally displays, will not allow us to suppose, it has resulted from her caprice. From what, then, arises this exception to the general arrangement? A consideration of the office of this sense, will itself inform us; this is, to apprize us of the contact of external objects. Now as these may be applied to any part of the surface of the body, a circumstance to which it is constantly exposed, it is necessary that every part should be endowed with a sensibility to their presence, though

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in various degrees. This sense was, consequently, assigned to the skin, or dermoid tissue, and resides, to a degree of ex=
=treme delicacy, in the points of the fingers, which are es=
=pecially intended to examine the condition of the sur=
face, the bulk, shape, and consistence of things. It may be, consequently, injured or even annihilated, in one part as is the case sometimes in palsy, and yet contin ue unimpaired in others. But such is not the case, with any of the other senses. In these, an injury specifically small may be totally subversive of their designs and offices. If, for example, a part of the eye have sustained an injury as in pterygium, canthis in which, only the vessels of the outer membrane of the eye, the adnata, are enlarged; while every other part of the organ remains perfectly sound; in opacity of the cornea, in cataract, sight is invariably ob=
structed or totally destroyed. In obstructions of the outer meatus of the ear, in the loss of its small bones, or when the eustachian tube is stopped up, partial or total deafness is the necessary result; and if the tongue which is the

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principal organ of taste, be affected with disease, this sense must be proportionably lessened. While the advantage is thus perceived, which the touch, as to extent, possesses over all the other senses, as well as the ~~ad~~ utility of the arrangement; the propriety of giving to the latter, such a degree of elevation, as would remove them, as far as possible, beyond external injury is, it is believed, rendered equally manifest. So true is this, that the sight, which has been regarded by the moral, as well as by the medical philosopher, "the most perfect and the most delightful of all our senses" rises superior to all the rest, and compensates the head, for the security it bestows, by being the first, to apprize it, of approaching danger.

I.4. The position of the head is productive of incalculable advantage to the brain, by the facility which it gives to the return of the great quantity of blood, required by that large and important viscus. So great is this facility, that it has been found necessary, in many places, to give

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to the bony channels, in which the vessels are accommoda=
=ted, numerous expansions and contortions to act as remo
=ra to its descent. This arrangement is particularly obvious
in the groove on the internal surface of the mastoid por=
=tion of the temporal bone, and in the junction between
the fourth, the lateral and longitudinal sinuses, on the an
gle of the occipital cross, constituting the Torcular Herop h
=ili. All the sinuses of the dura mater seem to be des=
=tined to a similar office, - an office which they perform,
with perfect safety to the brain, by being situated at its
base, between the laminæ of that membrane. The con=
=nection which thus subsists, between the position of the
head and the passage of the blood distributed to the
brain, has at different stages of existence, a material
influence on the developement of the latter. This being
assigned to a very early period, it is easy to perceive the
propriety of giving to the head, in the foetal state, a pen=
=dent, instead of an elevated position. By this means, the
current of the circulation is rapidly determined towards

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it, while its return is retarded; and, even after birth, the same intention would seem to be maintained, by ren=
=dering the inclined position of the body, for some time, to the child, alone practicable. This accounts, therefore, for the relative disproportion of the head in early life; a disproportion, in some cases, so far extended, as to create a belief that it arises from disease, and to occa=
=sion serious mistakes, in the physical management of children, thus characterized.

I.5. In many diseases, the position of the head is a cir=
=cumstance not to be entirely overlooked or disregarded by the physician. In all the various fevers, in which the brain is liable to be attacked, in ophthalmia, and other diseas=
es of the same parts, depending on inflammation; it is I think, almost superfluous to mention the great advan=
tage of placing the head erect. The same remark may be made with respect to apoplexy, whether serous or san=
guineous, hydrocephalus, concussion and compression of the brain, and all cases of fulness in that organ

So great is the influence of this apparently trivial cir=
=cumstance, that, in some individuals, all that is necessa
ry to the production of a severe headache, or even an attack
of cephalitis, is to keep the head, for some minutes, in a
pendent attitude; and the same thing is aptly illustra
=ted in those, who, for the amusement of the public,
"stand", as it is termed, "on their heads. While engaged
in the performance of this feat, who that possesses even
a partial acquaintance with the human structure, can
contemplate, without apprehension, the great engorge=
ment of the head - engorgement indicated, but too
clearly, in the scarlet suffusion of the face, the swelling
of the lips and eye lids, the contortion of the features,
and the rolling of the eyes! In persons subject to dys
=pepsia, a slight stooping or inclination of the head,
is often sufficient to produce a return of the painful
symptoms of fulness, dizziness and blindness, which,
so frequently, accompany this unpleasant disorder. By
this, consequently, the propriety is indicated, of such per=

=sons giving to the head, while lying in their beds, a consider able elevation. From a neglect or ignorance of this simple and practical precaution, the symptoms above mentioned, sometimes become so severe, as to render the mere act of rising in the morning, not only disagreeable, but really painful; and, after its accomplishment, to produce a reeling, similar to that which results from intoxication, and a blindness of many minutes duration In cases of syncope, and of suspended animation resulting from a determination of blood to the centre, by which the brain is deprived of its natural stimulus; an important part of the treatment consists, in laying the patient in the horizontal posture, by which the return of the circulation may be invited to the head. In many instances, this single method is alone sufficient to restore the patient; a fact, of which a striking illustration is mentioned by Dr Physick, in his lectures on Anatomy, in the case of a gentleman, who from some peculiarity of constitution, always fainted, when he attempted to stand or

even to sit upright; and recovered, on falling back to the recumbent position. In the recovery of drowned persons, a proper disposition of the head seems of the highest importance. For since, in the language of Thomas, "dissections of those who have died by drowning, show that an accumulation of blood in the venous system, forms the great morbid change which takes place in accidents of this nature," and since, in the words of the same author, "the external surface of the brain appears of a highly florid colour;" a due elevation of the head is absolutely indispensable, to aid in the removal of this dangerous state of things. So true is this, that the opposite practice, which is frequently pursued by the vulgar, of depressing the head, and even, in some instances, suspending the patient, with the feet upwards, with a view of emptying the lungs and stomach of the water to which they ascribe the suspension of animation, has one great merit – that of speedily removing the unhappy sufferer from these tortures of ignorance, by extinguishing them

=ly remaining spark of life. The same remark is appli=
=cable to cases of strangulation and suffocation; in both
of which, however, as there is always a greater turges=
=cence of the vessels of the pia mater, its observance is
rendered more necessary.

II. 1. The shape of the head constitutes its next most re=
markable feature. Though, as before remarked, it is much
less liable, from its advantageous position, to external inju=
=ry, than any other part of the surface; yet, whenever it
does become subject to them, which, it is evident, must
sometimes happen, its oval conformation, most remark
able in its superior part, is obviously favourable to its
defence. This results from two circumstances; the compar
ative strength of all arched surfaces, and their well known
property of diverting offending agents from their course,
before any serious injury has been sustained. The first
is most advantageously exhibited in the case of falls,
and in the sustaining of weights; the second, in that of
blows from sticks and other like instruments. Immense

as is the strength of the muscles, it is, nevertheless, prob=
=able, that they would be unable to sustain, for any
length of time, a burthen which might always continue to
press upon the arch of the cranium, without producing
in it, the slightest fracture or alteration of shape.
This idea is susceptible of an experimental illustration,
and I will venture to assert, that if the experiment ever
should be tried, on the head divested of its integuments,
the weight which may be accumulated on the skull,
will exceed all previous supposition. The advantages
of the round conformation are equally manifested, in the vio=
=lence it frequently sustains from falls, & when forcibly
impelled, in running, against hard objects, such as trees,
posts, walls &c. without permanent injury to the individu
=al. From the immense importance of the parts enclosed
by the cranium, Nature seems to have exercised all her
skill, in providing against the ill effects which might
otherwise result, from various peculiarities of shape, oc=
=casioned by particular modes of life. Thus, in the heads

of those, who, from an early period of their lives, are accustomed to sustain upon them heavy burthens, by which the natural arch of the skull is almost converted into a plane surface, we usually find the counterwailing provision of an increased thickness, density and firmness. This arrangement is clearly manifested in the head of the negro, whose ability of sustaining, in this way, immense weights is familiar to all who are, in any degree, acquainted with that part of the human species; and never fails to excite the surprize of those who, for the first time witness it. It seems to me, indeed, from examining different heads, that according as the cranium is round and elevated, the bones are thin and delicate; while, in those which are flat and ill-formed, they are remarkably thick and clumsy. With regard to the second advantage wh. I have assigned to the rotundity of the cranium, that of diverting offending agents from their course, it is well illustrated, in the severe blows which are often inflicted on it; in sabre cuts, in which large portions

of the scalp are torn off, and which, if the head were flat, must inevitably have cloven it asunder; and, particularly, in the course which is frequently taken by musket balls, between the bones and skin, without any serious injury to the former. This remark has an important surgical relation; and, in accidents of this kind, should caution the surgeon, neither to speak nor act from the present appearances.

II. 2. But the general figure of the head is modified by some remarkable irregularities. These are the angular projections of the superciliary ridges; the mastoid & zygomatic processes of the temporal bones; and the round=ed protuberance of the occiput; not to mention, at pre=sent, the numerous and remarkable prominences of the face. And first of the superciliary ridges. On examin=ing this part of the head, it will be found, that the inter=nal and external tables of the cranium do not correspond or unite with each other, but on the contrary diverge, so as to form a cavity over each of the supercilia, the dimen

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sensions of which may be described, as varying from a few lines, to a half inch at their base; and from half an inch to an inch in length, in different heads. This affords an additional instance of the skilful economy of Nature. While, from the prominent situation of the eye, combined with the extreme delicacy of its organization, it became necessary, that such an arrangement should be adopted for its defence, we find this last productive of many other important uses. The superciliary ridges first, form over the eye a strong and solid arch, and contribute to the formation of the firm socket, in which that organ is enclosed. 2nd: It is from the superciliary ridges, that the eye brows recieve that elevation, by which they are enabled to absorb the superabundant rays of light – an office which physiologists have usually assigned to them. 3rd: They afford a firm base of support, for the front of the cranium; & lastly, by their solidity and firmness, contribute materially, to the protection of the encephalon. This last mentioned advantage is still farther promoted, by

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the extensive cavities situated behind them; in proof of wh. it may be mentioned, that an arrangement somewhat similar, exists in the occiput, which, next to the front, is certainly the most exposed part of the head, and encloses a part of the encephalon, which, according to the experiments of Segallois, and others, is by far the most necessary to the life of the individual. In illustration of the beneficial influence thus assigned to the frontal sinuses, I will here take occasion to submit a brief notice of a case which, some time since, I was afforded an opportunity of witnessing in person. Mr. P, having been attacked by robbers received on his head three wounds wh. were subsequently ascertained to have been inflicted with a blacksmith's sledge hammer. They were each attended with very extensive fracture of the bone. One of them was situated on the upper part of the os frontis; a second behind this and lower down, on the parietal bone; the third lay in a transverse direction, over the left eye, being about an inch and a half in length, and about half

an inch in breadth. From the existing symptoms, and an examination of the head, about an hour after the occurrence, it was found, that in the two first wounds the bone was considerably depressed and required the employment of the trepline for its removal; after which, the patient having revived, and the symptoms of compression disappeared, it was concluded by the attending physicians, not to interfere with the third wound - a proceeding fully justified by subsequent circumstances presently to be mentioned. It is unnecessary for my purpose, to detail minutely the progress of the case; it will suffice, to state, that in the course of the treatment, it was found necessary to puncture the dura mater, in one of the wounds, in order to evacuate the pus which had collected beneath it; and that hernia cerebri having followed this operation, the patient expired, about the nineteenth day after the original injury was sustained. The head was examined after death, and attention directed, particularly, to the third wound which had not been operated on. The external table of the bone was found

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fractured to the extent already mentioned; the internal on the contrary, unbroken except at its upper corner; & here the depression was little more than perceptible. There was no inflammation, and bony union was regularly proceeding: little permanent injury, if any, therefore, would have followed this injury. Here, therefore, I conceive the advantage I have assigned to the Sinuses, to be clearly indicated - the fracture in the external table of the bone in the third wound though equally extensive with that of the other two, being attended with very little injury to the inner table. What I have said respecting the superciliary ridges, is equally applicable to the occipital protuberance. It is solid and thick; and it is manifest that the entire bone is admirably adapted, by the same properties, to the protection of the important parts which it encloses. There is another respect in which this protuberance is attended with the best effects. Falls, in the human species, are either forwards or backwards. In the former case, the hands are involuntarily extended to prevent the forehead from striking the ground; while,

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in the latter, the same means of defence not being enjoyed, the deficiency is supplied, by the great density and thickness of this protuberance. The zygomatic processes of the temporal bones, besides forming a safe enclosure for the temporal muscles, and affording insertion to the corresponding fascia; together with this fascia, (which would seem, from its remarkable strength and thickness, as intended to supply the place of bone,) complete the general rotundity of the head, and contribute to its solidity, by uniting the malar and temporal bones, firmly with each other. The mastoid processes, externally considered, afford a strong and favourable insertion to the sterno cleido mastoid muscle - an agent of the higest importance, in the various motions of the head. Internally, their structure is cellular; and it has been suggested by physiologists that "these cells, the extent of which increase with age, are perhaps necessary, in order to make up, by augmenting the power of the vibrations, for the stiffness of the membrane protecting the labyrinth, & for the diminished sensibility of the acoustic nerve."

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II. 3. Among many distinguished enquirers, the figure of the head has, of late, constituted a prominent mark of distinction between the various species of the human race, and an index, of general correctness, to their moral and intellectual characteristics. Even in ordinary intercourse, a similar observation is far from being uncommon. The head is the seat of the brain and consequently of the mind. Enquiries extended through the various gradations of animated nature, seem to have led to the conclusion, that a peculiar form of the head, designates the approach of animals to an intellectual character, and an aptitude for education. It is well known, that animals, scarcely differing in any other respect from each other, exhibit a direct contrariety of temper and disposition. Why is the wolf fierce and untameable, while the dog is gentle, docile and susceptible of instruction, to an astonishing degree; nay, even excelling man, in many of those attributes which do honour to the human name — in the ardour and disinterestedness of his friendship, the unshakeable firmness of his attachment; the dauntless

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intrepidity of his courage, and the fervour and generosity of his gratitude. We observe the same difference between the lion and the horse; the elephant & the rhinoceros; the camel and the bison; yet, in all these cases, the head is the only part in which there exists a well marked difference of conformation. Not only is this the case, among different tribes of animals; but also, among different individuals in the same tribe. This remark is well illustrated in the different species of dogs, which are each marked by its peculiar traits. The blood hound, grey hound, mastiff, terrier, cur &c, all differ widely from each other, while the head constitutes (if we except varieties in size, which cannot properly enter into the account) the only mark of physical dissimilitude. These facts, I conceive, therefore, justify a conclusion, that the same means of distinction has been extended to our own exalted species; and this conclusion is still farther corroborated by daily observation & general experience. We rarely find a small misshapen skull, with a narrow, depressed forehead, and small angular face,

allied with a comprehensive intellect, or brilliant genius; while the high expansive forehead, the well turned and el=evated Cranium, and the face descending from it, in nearly a vert=ical direction, impresses us, on the first view, with a sense of the mental superiority of their possessor. On this interesting subject, the celebrated Camper has come to the following con clusion. If a line be drawn longitudinally, from the fore=head to the mouth, and another transversely, from the point of the ear, to meet the other line; the head will be perfectly formed, in proportion as these two lines approach to a right angle. The skull of the Grecian makes nearly a right angle; that of the European of colder climates is something less; the savage and the Hotentot have their gradual approaches to an acute angle, in consequence of the greater or less protrusion of the bones of the face; the ape, the dog and the swine make a still more acute angle; till, at length, in the beaks of birds, the two lines nearly meet. The junction of the lines, above referred to, constitutes what has been denominated the facial angle; and the application of it which

has been thus made to the different animals, above mentioned, is entirely supported by history and experience. The distinguished name of Cuvier, than whom few philosophers have acquired a more extended fame, may also be ~~added~~ adduced in support of this position. "Of the human species," says he, "there are three which are eminently distinct in appearance. They are the white or Caucasian; the Yellow or Mongolian; the Negro or Ethiopian. The Caucasian race to which we belong, is distinguished by the beautiful oval form of the head; and it is this which has generally given birth to the most civilized nations, and to those which have ruled over the others. It has some difference in the shade of the complexion and in the colour of the hair. The Mongolian is known by its prominent cheek, flat face, narrow and oblique eyes, straight and black hair, thin beard and olive complexion. It has formed vast empires in China and Japan, and has sometimes extended its conquests on this side of the great desert; but its civilization has always remained stationary. The Negro race is confined to the

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South of Mount Atlas: its complexion is black, its hair woolly; its skull compressed, nose flattish; its prominent mouth and thick lips make it manifestly approach the Monkey tribe: the people which compose this race, have always remained in a state of barbarism." As to the influence of what has been termed the facial angle, it may be perceived in the following observations, which I will here take occasion to introduce from Doctor Horner's Treatise on Anatomy; whose authority, in favour of this position, it affords me much pleasure, to be able to add to that already adduced. "An invariable relation is manifested between the extent of the facial angle, the capaciousness of the cranium & the size of the nasal and palatine cavities. The nearer this angle approaches to a right one, the smaller is the cavity of the nose and of the mouth, and the greater is that of the Cranium, thereby manifesting a more voluminous and intellectual brain. On the contrary, the more acute the facial angle is, the smaller is the volume of the brain, and the larger the nose and mouth. This is so frequently the case, that Bi

=chat considers it almost a rule in our organization, that the development of the organs of taste and smell, is in an inverse ratio to that of the brain, and consequently to the degree of intelligence." But how far does this physical dis=tinction between the intellectual attributes extend? To an ex=act determination of the degree of each, or only to a general indi=cation of their aggregate superiority or inferiority? Shall we con=cede the former with Gall, Spurzheim & their disciples, or u=nite with their more sceptical opponents, in maintaining the reverse? To enter particularly into the discussion of this ques=tion, is certainly foreign to the design of the present essay; but it is proper to remark, that whatever Craniologgy, as a theory, may be, the pursuits and investigations which it solicits, are closely connected with anatomical & phys=iological advancement. The researches of Gall & Spurzheim have, by common consent, contributed more to explain the structure and formation of the brain, than those of any o=ther anatomists; &, as many of the most important phy=siological truths have followed their discoveries, which might

otherwise, have yet remained unknown; their exertions deserve, if not imitation, at least respect; and their beautiful theory, if not the implicit belief, at least the investigation of the scientific.

II. 4. If the intellectual character and the conformation of the head, be thus mutually connected, why is not the former altered and modified, in proportion to the changes effected in the latter, by mechanical agency? Among many of the savage tribes, particularly the Indians of Peru, & some of those who inhabit the continent of North America as the Choctaws and some of the Northern Indians; alterations of this kind are not uncommon; the head being sometimes flattened before and behind, sometimes on the sides; sometimes into a conoidal, & in other instances, a quadrangular form; yet they do not appear to differ essentially in their general characteristics, but alike solicit the same unsettled and uncivilized mode of life. They are found to be addicted to similar occupations, as of war, hunting & fishing - are alike cruel or humane;

and alike disposed to promote or resist the attempts wh. have been made, to introduce among them the laws & manners of civilized nations. But this certainly constitutes no va=lid objection to the doctrine, I have endeavoured to sus=tain; since the same similarities are found to exist a=mong the inferior animals, though of different species, and different physical conformation. The lion, the bear the tiger and the hyena, are alike similar, in ferocity & indocility; the researches of naturalists afford various examples of the same kind; and from this, it is reason able to conclude, that these points of resemblance belong not to the domain of intellect but of instinct - of instinct unalterable by the interference of Art, and implanted in the savage race of man from the earliest period of his ex=istence. It has consequently happened, that even where those children of the forest, have been taken to the abodes of sci=ence and cultivation, and their minds directed to the sub=lime enquiries of civilized man; this eternal and immu=table attribute of their race, has still prevailed; they have

abandoned the halls of literature and Philosophy; they have returned to the solitude of their native wilds, and have entered with an increased ardour, into those pursuits from which education had vainly endeavoured to divert them. But so far as intellect is concerned, sufficient has, I conceive, been said, to establish the position I have adopted. It has been shown, that the heads of the Caucasian ~~and~~ Mongolian & Negro races, each differing widely from the others, in their intellectual attributes, are very different in conformation; and extending this fact, to the mechanical alterations to which its form is subjected among the savage tribes, above mentioned, I think it reasonable to assign to them in general, not attempting to point out particular shades of difference, a weakness, an imbecillity of the mental faculties. How far is this opinion supported by the fact, that mal-conformation of the head is frequently a cause of insanity, according to writers? Bichat while he admits, that such changes may be

effected in the human head, acknowledges his inability to effect them in puppies, kittens and indian pigs. Perhaps this may be regarded, as affording an explana=tion of the permanency and unchangeableness of animal instincts; and arises from the circumstance, that in these animals, the brain being principally designed for instinct and sensation, which are indispensable to their preservation, Nature has so closely connected its integrity with their existence, as to render it impossi=ble to alter the one, without the destruction of the other. The same remark may be applied to that part of the human brain, which possesses a similarity of function. According to the most eminent modern Physiologists, this part is the medulla oblangata and the pons varolii; which last, in the language of Broussais "as the most essen=tial, is also the best protected and most hidden of the whole encephalic mass." It is consequently impossible, to effect in this any change, without the entire destruction of the individual; the part of the head corresponding to the cer=

=ebrum, to which the same enquirers assign the intellectual functions, may be variously altered, without at all affect=ing this; and hence, I conclude, that while the faculties of the mind may be modified by mechanical changes, in the conformation of the head; instinct may remain entirely unchanged, and possess an identity of character, in all animals of the same species.

III. 1. If the arch of the Cranium be detached from the face, the first circumstance we remark, is the inequali=ty of the surface thus presented to view. This consists of numerous angular projections which contribute to the security of the brain, by affording to it, numerous points of attachment and connection. This opinion seems to be cor=roborated, by a consideration of the nature of these attach=ments, in different parts of the cavity of the head. On the base, which sustains the entire weight of the brain, they are solid and immoveable, consisting of hard and compact bone; while in the superior and lateral parts, where separa=tion only seems necessary, they are formed by a membrane

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at once smooth, secure and pliable - allowing to the viscus to which they belong, sufficient motion and effectually pre=
=venting either adhesion or improper separation. On exam=
=ining these prominences individually, it will be seen, that while they thus give security to the brain, many of them perform an additional office, no less useful, in relation to the nerves and blood vessels, which emanate from, or are di=
=rected towards it. I conceive, for example, the crista galli of the ethmoid bone, well adapted to protect the minute rami=
=fications of the first pair of nerves, in their descent through the for=
=amina of the cribriform plate; for, if we suppose it to be re=
=moved, there appears to be nothing to prevent the contiguous part of the cerebrum, from occupying the cavity around its base. It seems, therefore, to act like the pole of a tent, eleva=
=ting the dura mater and therefore the brain, to a sufficient height. A similar design appears to exist in the projec=
=tion of the upper part of the foramen opticum, in regard to the second pair of nerves; in the foramen lacerum anteri=
=us, to the third, fourth, sixth and first branch of the fifth

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pair; in the anterior and posterior clinoid processes, to the op=tic nerves, where they unite on the sella turcica; in the ledge of bone projecting over the vidian foramen, in the meatus au=ditorius internus, and, finally, in the foramen caroticum, through which is transmitted the chief bloodvessel of the brain. With regard to this last, its peculiar and abrupt curvature has been universally remarked, as intended to diminish the impetus of the large current of blood, of which it forms the channel.

III. 2. The arrangements adopted in the occiput, for the security of the cerebellum and contiguous parts of the brain, are still more remarkable. In a former part of this essay, it was observed, that whatever changes other parts of the head & consequently of the brain might be subjected to, through mechanical influence; this still remained unaffected, in any material degree. It was attempted to exhibit the ad=vantages arising from this peculiarity, by stating the im=portance of the enclosed parts, to the preservation of the in=dividual; and, I conceive, that its properties of density and

firmness, on which this peculiarity depends, will be suffici-
-ently explained, by a consideration of its growth and devel-
opment. Consulting the writings of anatomists, we find that
as early as the third month of the foetal existence, the pro-
-cess of ossification has somewhat advanced, in all the bones
of the head; that it is more extensive about its base, and
particularly so at its back and lateral parts. At birth, the
base is entirely ossified, with a few minor exceptions; & seems
to be but slightly acted on, even by disease affecting its o-
-ther parts; a fact which is obvious in hydrocephalus. Its
possession of the properties above mentioned, is the consequence
of this advance of ossification, and enables it to resist every en-
-croachment, whether of injury from without, or of the verte-
-bral column below. Nor is this the only benefit of which they
are productive. It will be found, on examination, that the
bones which form the base of the cranium, are chiefly
hollow and destined to the performance of important
duties. The ethmoid and sphenoid bones are occupied by a
continuous cavity, which physiologists have regarded as com

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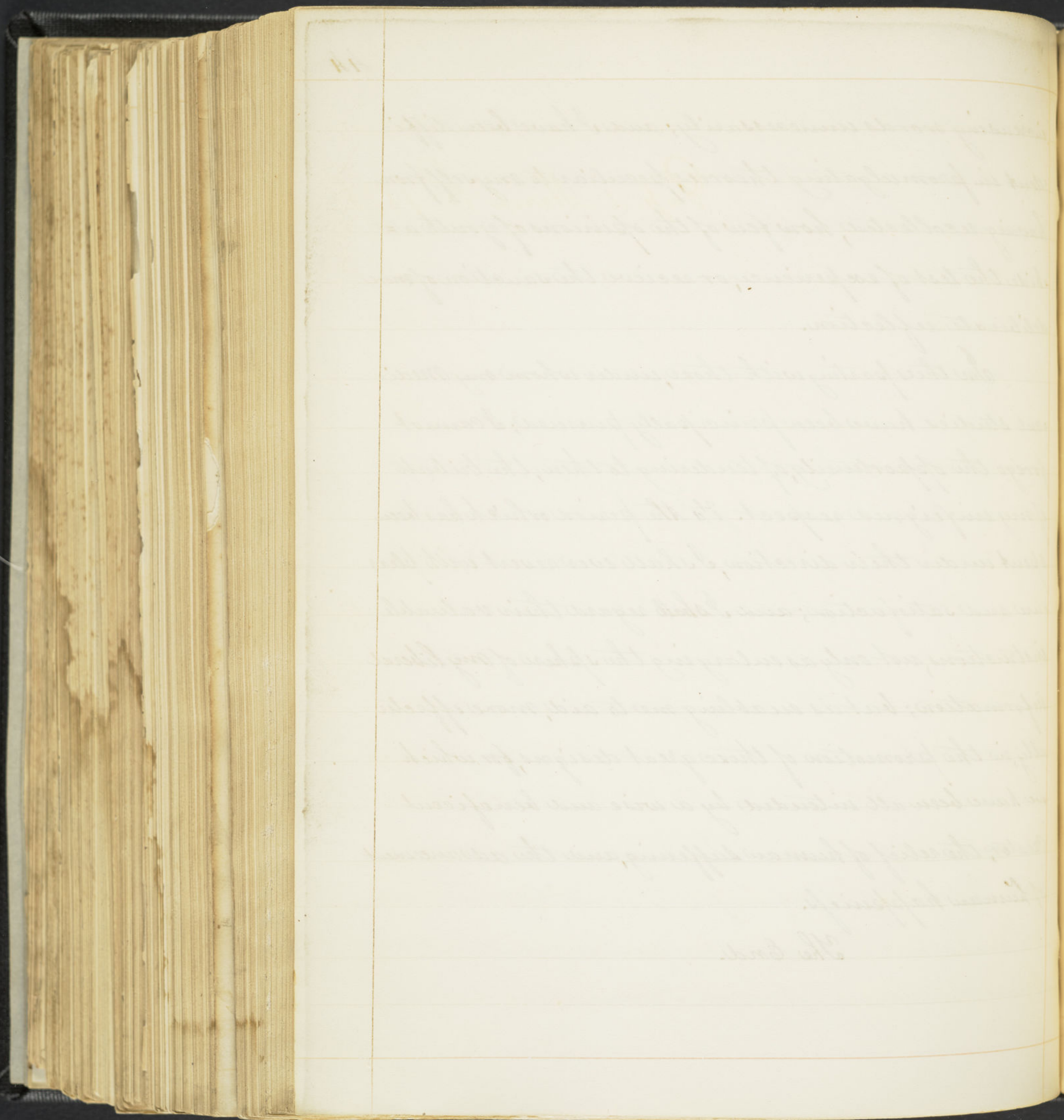
=tributing to the perfection of the sense of smell, by affording a more extensive surface, for the expansion of the olfactory nerves; and the petrous portion of the temporal bone, is the well known depository of all that complicated & minute structure which constitutes the organ of hearing. Such being the case, the advantage, resulting from the hardness and solidity of these bones, must be clearly indicated. This last is, indeed, the hardest and most compact bone to be found in the system; and approaches more nearly than any other, in its composition, to the enamel of the teeth.

With these observations, I shall close my inqui=ries, at present, into this highly interesting subject. It will be percieved, that many points connected with it, have been entirely omitted; and others, only briefly noticed, which have, individually, elicited protracted discus=sions. This step, will not, I think, be considered improper, when the motives which impelled me to it are understood. To repeat what has been already so frequently detailed, and is now generally known, I concieved would be only

increasing words unnecessarily; and I have been diffi=
=dent in promulgating theories, peculiar to myself, from
having recollected, how few of the opinions of youth a=
=bide the test of experience, or recieve the sanction of more
deliberate reflection.

In thus parting with those, under whom my Medi=
=cal studies have been principally pursued; I cannot
forego the opportunity, of tendering to them, the tribute
of my unfeigned respect. To the period which has been
spent under their direction, I shall ever revert with plea=
=sure and satisfaction; and I shall regard their valuable
instructions, not only as enlarging the sphere of my liberal
information; but as enabling me to aid, more effectu
ally, in the promotion of those great designs, for which
we have been all intended by a wise and beneficent
Creator, the relief of human suffering, and the advancement
of human happiness.

The End.



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Dr Gibson

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